# Book reviews

## Business acumen and scientific knowledge

**Sir Charles Wheatstone FRS 1802–1875** Brian Bowers (Science Museum) *London: HMSO* 1975 *pp* 239 *price* £5·50

'Wheatstone was pursuing a piece of scientific research, Cooke was embarking on a business venture' writes Dr Bowers about the invention of the telegraph. Here perhaps he does less than justice to the business acumen of Wheatstone, whose petty bourgeois origins, and rejection of any but equal status in his partnership with Cooke, he confirms elsewhere in this delightful book. The success of the venture certainly depended on Wheatstone's scientific knowledge; as he said, 'The most important point of all was my application of the theory of Ohm . . .' which had been published only ten years before and was apparently unknown to other workers in telegraphy.

Dr Bowers puts Wheatstone's work on the telegraph into perspective, corrects a number of popular misattributions (Playfair cipher, actually Wheatstone; Wheatstone bridge, actually Christie) and throws what light he can on Wheatstone's family life. A valuable book. A pity it is so expensive.

F A E PIRANI

## Pocket calculators

**Scientific Analysis on the Pocket Calculator** J M Smith *London: J Wiley* 1975 *pp* xii+380 *price* £6·50

Your reviewer is frequently accused by friends and colleagues of an inordinate affection for both books and pocket calculators. He certainly would admit to bibliomania and also to the other mania if it only possessed a name (abaciomania ?). Could anything therefore be more blissful to him than a book on pocket calculators? Jon Smith's book was awaited with eager anticipation. It was not a disappointment.

The main thesis of this extensive book is that the pocket calculator provides not only a satisfactory method of rapidly processing data but also gives the scientific analyst a very convenient way of learning the mathematical models and tools employed in technical disciplines other than his own specialism.

The book is divided into four parts. In part one, Smith discusses the various types of calculator that are available to engineers and scientists and introduces certain basic numerical methods. He extends the treatment in part two to numerical methods and formulae for numerically evaluating advanced mathematical functions. Part three looks at such topics as numerical evaluation of definite integrals and methods for numerical differentiation of data sets, solving differential equations, simulating linear processes, performing statistical analysis and harmonic analysis. The final part of the book deals exclusively with the almost incredible feats of analysis that can now be done on the programmable pocket calculator.

In the treatment of topics throughout the book there is a heavy emphasis upon the interests of those who wish to *use* the pocket calculator as a tool. Every technique and method is illustrated by well chosen numerical examples.

Unless you have already thought long and deep in this area Smith's book will certainly give you fresh insights into how useful your calculator can be and a deeper view of its potentialities as a learning machine. What more could you reasonably ask?

M EBISON

## Metals and liquids

**The Physics of Metals Vol 2: Defects** P B Hirsch (ed) *London: Cambridge University Press* 1976 *pp* xix+302 *price* £13·50

Despite the delays and the consequent surcharge, this second opportunity to tour the Mott Country in celebration of Sir Nevill's 60th birthday will be welcomed by many. A strong but interestingly varied team of guides has been collected. The main flora and fauna are carefully described by Eshelby (point defects) and by Frank and Steeds (dislocations). Whelan explains the electron microscopy techniques which have done so much to vindicate the theoretical ideas of Mott and his colleagues. Nabarro guides us through the undergrowth of solute hardening and Hirsch takes us to the still smoking battle fields of work hardening.

With Cottrell (fracture) we ascend to the heights above the tree line where the quantum does not merely go unharvested but scarcely seems to propagate at all. It is interesting to see how few concepts this volume shares with its predecessor on electrons. Only in Whelan's article do Bloch waves make their appearance. Perhaps the story might have been a little different had time or the title permitted the inclusion of some of the recent work establishing the significance of dislocations in semiconducting device performance. As it is, the two books justly commemorate Mott's achievement in making major contributions to such diverse fields.

A HOWIE

**Simple Dielectric Liquids** T J Gallagher *London: Clarendon/Oxford University Press* 1975 *pp* vi+154 *price* £6

The study of electrical conduction and breakdown in hydrocarbon and cryogenic liquids has resulted in an extensive and often conflicting body of experimental evidence, augmented by a multiplicity of hypotheses nearly all of which lack satisfactory authentication. Very recent experimental advances have, however, yielded results of such significance as to demand a thorough reappraisal of the whole topic. This is the task which the author has set himself and in which he has succeeded admirably.

The subject matter is treated in order of increasing complexity under the chapter headings (i) mobility, (ii) conduction and (iii) breakdown. Not only is the published evidence effectively reviewed, but controversial hypotheses are critically reassessed. In this latter context the sections dealing with the effects of impurities and of fluid movement on measured mobility, and of particulate matter on conduction current are extremely valuable, while the arguments between the mechanisms of breakdown initiation involving gas phase phenomena as opposed to electron collision ionization are both logically and concisely presented.

The text is well referenced and indexed, and has that regrettably rare quality of being eminently readable. It should provide a sound basis of knowledge from which to plan further advances in this rather specialized field.

P E SECKER

## Spectroscopy

**Molecular Spectroscopy** I N Levine *Chichester: J Wiley* 1975 *pp* x+491 *price* £10·50

This is a book about the theoretical background of molecular spectroscopy. Summaries of relevant aspects of quantum mechanics, the properties of matrices and of group theory (200 pages) are given at such length that something has to go and this is not a balanced account. Raman spectroscopy gets about four pages, electronic spectroscopy, including photoelectron spectroscopy of diatomic and polyatomic molecules, is run off in 24 pages, at less than half of the length devoted to NMR and ESR. There is little contact with